Amendments to the Specification:

On page 1, below the title and above "TECHNICAL FIELD", please insert the following new paragraph:

--This application is the United States national phase application of International Application PCT/JP2003/011880 filed September 18, 2003.—

On page 1, please replace the last full paragraph with the following amended paragraph:

A quasi-phase matched wavelength conversion optical element has been proposed in which a periodic polarization inversion structure is realized by applying a stress to quartz crystal (SiO_2), which is a paraelectric material, in the vicinity of the α-β phase transition temperature, so that a periodic twin structure is created (S. Kurimura, R. Batchko, J. Mansell, R. Route, M. Fejer and R. Byer: 1998 Spring Meeting of the Japan Society of Applied Physics Proceedings 28a-SG-18). This is a method in which a quasi-phase matched crystal based on quartz is manufactured by utilizing the ~~Dauphine~~ twin crystal of quartz to achieve a periodic inversion of the sign of the nonlinear optical constant d_{11} and d_{22}.

On page 2, please replace the first full paragraph with the following amended paragraph:

In the case of quartz, the short absorption edge is a wavelength of approximately 150 nm, and ultraviolet absorption at wavelengths shorter than 200 nm is almost neglegible compared to the case of nonlinear optical elements using conventional birefringence phase matching (β-BaB_2O_4 and $CsLiB_6O_{10}$, etc.) or nonlinear optical elements using the quasi-phase matching of ferroelectric materials ($LiNbO_3$ and $LiTaO_3$, etc.). Accordingly, light with a wavelength of approximately 193 nm comparable to that of an ArF excimer laser can be generated with high efficiency by second harmonic generation, and semiconductor exposure apparatuses using this have also been proposed (Japanese Patent Application Kokai No. 2002-1222898). The crystal axis inversion period in this case is approximately 0.95 μm.

On page 2, please replace the last full paragraph with the following amended paragraph:

Lithium niobate and lithium tantalate are universally known as conventional quasi-phase matched

crystals, and there has been active research aimed at the direct conversion of light, etc., in wavelength-multiplexed optical communications. However, in the case of lithium niobate and lithium tantalate, optical damage caused by the photorefractive effect is a major problem, so that there have been limits to utilization at a high output power. In the case of quartz, on the other hand, there is no optical damage due to the photorefractive effect, so that use in a sufficiently stable state is possible. ~~The crystal axis inversion period at a wavelength of approximately 1.55 μm, which is commonly utilized in optical communications, is approximately 70 μm.~~

Please replace the last paragraph on page 3 which continues to the top of page 4 with the following amended paragraph:

Various methods are known as methods for manufacturing an artificial twin structure in quartz; however, the hot pressing method has currently been proposed as the most influential method (S. Kurimura, I. Shoji, T. Taira, M. Fejer, Y. Uesu and H. Nakajima: 2000 Fall Meeting of the Japan Society of Applied Physics Proceedings 3a-Q-1). In this method, a

periodic step structure is formed on the surface of one side of a quartz crystal substrate, this quartz crystal substrate is clamped between heater blocks from above and below, the temperature of the quartz crystal substrate is elevated, and pressure is applied at the point in time at which this temperature reaches a desired temperature. In this case, since stress acts only on the portions corresponding to the protruding parts of the step structure, the crystal axis ~~components are~~ is inverted only in these portions. These portions with inverted crystal axes grow to the interior of the crystal and are thus propagated into the crystal, so that a periodic twin lattice that penetrates greatly in the direction of depth can be manufactured. Specifically, stress is concentrated only in the protruding portions, and twins are generated from these areas; these twins gradually grow into the interior, so that a twin structure with a large aspect ratio is manufactured.

On page 11, please replace the first full paragraph with the following amended paragraph

No stress is applied to the recessed parts (surfaces that are lower than the surfaces of the

protruding parts) that are located between the protruding parts of the fine pattern; however, if the width of these recessed parts is made sufficiently narrow, then portions with inverted crystal axes are also formed in the interior portions of the crystal corresponding to these recessed parts when the portions with inverted crystal axes that are generated in the protruding parts grow into the interior portions of the crystal and are propagated along the depth into ~~the interior portions of~~ the crystal, so that the respective portions with inverted crystal axes are connected in the interior portions of the crystal, thus making it possible to form portions with inverted crystal axes that have a desired shape.

Please replace the last paragraph on page 17 which continues to the top of page 18 with the following amended paragraph:

When the portions with inverted crystal axes are propagated into the interior portions of the crystal (the portions beneath the protruding parts 2 of the quartz crystal substrate 1), propagation also takes place in the portions of the recessed parts 5, so that portions in which the crystal axes are inverted are

formed in a form in which the recessed parts 5 between the respective protruding parts 4 are embedded and connected in the interior portions of the crystal. The inverted regions are ultimately formed over all desired regions, and these portions grow toward the opposite surface of the quartz crystal substrate 1 along the direction of the c axis. Specifically, the substantially rectangular portions 6 indicated by broken lines in Figure 1 constitute crystal axis inversion regions. Conversely speaking, the width of the recessed parts 5 must be set at a width which is such that the crystal axis inversion regions are connected in the interior portions of the crystal by the propagation of the portions with inverted crystal axes when pressing is performed. In actuality, it is desirable that this width be ~~at least~~ a few microns or less.